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THE ANGORA GOAT.

BY

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LETTER OF TRANSMITTAL.

U. S. DEPARTMENT OF AGRICULTURE,
BUREAU OF ANIMAL INDUSTRY,
Washington, D. C., July 1, 1901.

SIR: I have the honor to transmit herewith a manuscript on "The Angora Goat," which has been prepared as a farmers' bulletin by Mr. George Fayette Thompson, editorial clerk of this Bureau, in accordance with your instructions. This is necessarily a condensation of the larger bulletin (No. 27, B. A. I., "Information concerning the Angora goat") which was issued by the Bureau in January last, and for which there has been a large demand.

The indications are that the great interest now manifested in the Angora goat will soon result in establishing their raising as one of the important live-stock industries of our country. The 400,000 (more or less) of these goats which have been heretofore almost wholly confined to the West and Southwest are being shipped into every State of the Union. Many reports of their good work in exterminating brush have already reached the Bureau.

Respectfully,

D. E. SALMON, *Chief of Bureau.*

HON. JAMES WILSON,
Secretary.



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THE ANGORA GOAT.

INTRODUCTION INTO THE UNITED STATES.

During the Administration of President Polk, the Sultan of Turkey requested of him to recommend some one who would experiment in cotton culture in Turkey. Accordingly, Dr. James B. Davis, of Columbia, S. C., was recommended and received the appointment. The work which he did was so highly gratifying to the Sultan that, upon the return of Dr. Davis in 1849, he reciprocated the courtesy of the President by presenting the doctor with nine Angora goats. Of these, seven were does and two were bucks.

These goats were then and for many years afterwards thought to be of the Cashmere breed, from the fiber of which the costly Cashmere shawls were made. As they came to be better known, however, the differences between the Cashmere and Angora breeds were easily observed. A description of the Cashmere, according to Israel S. Diehl, an authority, is as follows:

It is covered with straight and falling long, fine, flat, silky hair, with an undercoat in winter of a delicate greenish wool of but 2 to 3 ounces each, which latter alone constitutes the fabric from which the celebrated shawls are made. Ten goats furnish only enough for a shawl $1\frac{1}{2}$ yards square; but this is often found differing, both in the color and the quality of the wool, or rather the fine hair, of which the fleece is composed.

This soft undercoat is known as "pashm." It is combed out in the spring, and is worth, when cleaned, in the country where it is produced, from \$1.50 to \$2 per pound. In the case of the Angora goat, the entire fleece is taken, and weighs from 2 to 10 pounds.

The Davis importation of Angoras was frequently exhibited at fairs, and everywhere attracted much attention and received favorable comments. It was unfortunate for the industry at that time that they were thought to be of the Cashmere breed, for everything that was known about the Cashmere breed was claimed for these goats. As an Angora goat can not fulfill the requisites of a Cashmere goat any more satisfactorily than Jersey cattle can serve the purposes of the beef breeds, there was abundant room for the disappointment which soon followed and almost drove the Angora, useful as it is now regarded, out of consideration.

In 1853 the Davis goats were purchased by Col. Richard Peters, of Atlanta, Ga., with the exception of one owned by Col. Wade Hampton, of South Carolina, one by Mr. Davenport, of Virginia, and one by Mr. Osborne, of New York. Later Colonel Peters imported others, but they did not prove satisfactory. He is generally looked upon as the real founder of the Angora goat industry in the United States. Other importations occurred from time to time up to 1876. In 1881 the Sultan absolutely prohibited the exportation of Angoras, and this prohibition is still in effect. A few animals have been imported from Cape Colony. Notwithstanding the prohibition of exportations from Turkey, Dr. W. C. Bailey, of San Jose, Cal., visited Asia Minor during the early months of this year, and in April succeeded in shipping out four goats. These arrived in New York in April, and left quarantine there for their California home on May 9.

The Angora goats of these several importations found their way into many of the Southern and Central States, but for some reason they seem not to have become a permanent industry there. At the close of the civil war about all the goats of this breed that remained in this country were in the Southwestern States, principally in Texas, New Mexico, Arizona, and California. Within the last few years many have gone into Oregon in large numbers, and quite recently several thousand have been taken into Iowa and Missouri. At the present time it can safely be said that they may be found in every State of the Union. An interest is manifested in them such as has never been known before, and it is believed that this interest will result in establishing permanently an industry that will extend to every part of the country.

DESCRIPTION OF THE ANGORA GOAT.

Israel S. Diehl, bearing a commission from the Commissioner of Agriculture, visited the province of Angora in 1867 for the purpose of investigating the conditions obtaining there with reference to the Angora goat industry. He learned that Turkey was compelled to export practically all of her mohair to Europe, owing to the fact that it could be fabricated there in a superior manner and at small cost. There was a heavy European demand for mohair, to supply which the Turkish growers, without wise foresight, began the practice of crossing the Angora upon the common Kurd goat of that country. The inevitable result of such a practice, involving as it did the whole Angora goat industry, was to bring about to a large extent the conditions which have obtained in the United States, namely, a breed of Angoras of uncertain purity. It is exceedingly doubtful if there is anywhere an absolutely purebred Angora goat.

These conditions have produced various types of Angoras, even in Asia Minor, and a minute description of one would not apply to all. Some strains have fox-like ears, while others—and generally preferred ones—have long, pendent ears. There is also some evidence that there is a strain of hornless goats, and even a strain of mixed colors.

Henry O. Binns, who spent twenty years in the mohair district of Asia Minor, between 1864 and 1886, and who made a special study of the Angora goat during this time, describes the purebred as follows:

The pure Angora in its prime is about the size of a five-months-old Cape [Cape of Good Hope] kid, with small, thin horns, woolled all over the body, its hair almost covering the eyes; exceedingly delicate, and so subject to disease that no one cared to keep it. What is to-day called the purebred Angora is like the English thoroughbred horse—the result of crossing and recrossing until body, class, points, etc., have attained to what is generally considered that the thoroughbred Angora ought to be.

The opinion of Mr. Schreiner, the South African authority, of a purebred Angora is as follows:

I think it is certain that the original purebred white mohair goat was a small, very refined, delicate animal, of great beauty, clipping at twelve-months' growth of fleece about from 2 to 4 pounds (according to age and sex—kids considerably less) of dazzling white, fine, soft, silky, very lustrous mohair, curling in ringlets from 10 to 18 inches long, with merely the minimum of oil in its fleece requisite to the growth of hair of the highest excellence, so small in amount as to be inappreciable to the unskilled observer. It was perfectly clothed in every part; it had short, silky, curly hair about the face and down the lower parts of the legs to the hoofs; a soft, silky, curly "kuif" (tuft on the forehead), and small, thin, light-colored horns. The ewe was, of course, smaller and finer than the ram, and had only one kid at a birth (of this there is abundant evidence).

Probably the best description of the American Angora is that given by Mr. Gustav A. Hoerle, which is given below. Reference is to first-class animals, and not to grades of various degrees:

The body should be long, and the rounder the better; the back straight, with shoulders and hips equally high from the ground; shoulders and quarters heavy and fleshy; chest broad, indicating good constitution; the legs should be short and strong; the head is in shape like that of a common goat, but less coarse and cleaner cut; the horns are heavy, with an inward twist, inclining backward and to the outside.

Except just the face and legs, from the hocks and knees down, the entire animal should be densely covered with mohair, and neither the belly nor the throat nor even the lower part of the jaws should be bare, but should have a good covering of fine, silky mohair, and with the finest specimens the mohair tuft on the forehead should be well developed. The mohair should hang in long, curly ringlets. However, not every Angora goat which shows these perfectly curly ringlets of the mohair must necessarily be considered a thoroughbred; whilst, on the other hand, there are quite a number of really handsome and valuable thoroughbreds whose hair has not that much-desired shape, owing entirely to climatic and nutrimental influences, as well as to advancing age. Thoroughbreds and all nonshedding grades can easily be recognized by the peculiar shape of "points" of their mohair, each end showing plainly that it has been "cut off," instead of running gradually to what is called a "steep point," which is found with the hair of all kids and of shedding grade

Angoras. The plainer and longer this blunt point shows toward the end of the year the better is the fiber of the mohair, and the more valuable is the hair for combing purposes and the smaller the percentage of noilage and waste. After shedding, as well as nonshedders after shearing, the mohair grows very rapidly for some months. It grows slower toward the end of the year, and, with very bad climatic and nutritional influences, almost stops growing entirely. Therefore, if the late fall shearing is practiced, Angoras need good care during winter. The more even in length and quality the mohair is on all parts of an Angora body the better. When in full fleece the body of a fine thoroughbred Angora should appear like a right-angled square, with no gaps or deficiencies of covering, especially below the belly. [See figs. 1, 2.]

Mr. Hoerle is encountering some opposition to his ideas of the non-shedding varieties. Because of this difference of opinion the Bureau submitted the question, "Do thoroughbreds (fourth cross or above) shed if not sheared?" to a large number of the breeders of the country.



FIG. 1.—"Prosperity," showing mohair 19 inches long.
(Photograph furnished by U. S. Grant, Dallas, Oreg.)

A study of the replies received shows that the great mass of these goats shed annually if not sheared to prevent it, but several prominent breeders knew of goats which do not shed. However, no two correspondents give the same reason why the goats do not shed.

A characteristic of the common goat that is very objectionable is the ever-present offensive odor from the bucks; in the Angora breed this odor is entirely absent, except at the rutting season, and then it is noted in a slight degree only. The odor in a fleece of mohair is milder than that in a wool fleece, and is not at all offensive.

NAMES OF THE SEXES AND THE FLESH.

The sexes.—Previous to the appearance of Bulletin No. 27 of the Bureau of Animal Industry, entitled "Information concerning the Angora Goat," there were no well-established names for designating the sexes of the goats. The male was indiscriminately called "male," "sire," "buck," "ram," and "billy," and the female "doe," "ewe," and "nanny." Often a writer uses two or more of them in one article, showing that he has not adopted any of them. An investigation developed the fact that the terms "buck" and "doe" were preferable, and these, being used in the bulletin mentioned, have generally been adopted by breeders everywhere.



FIG. 2.—"Princess Monterey," 10 months old. Fleéce $4\frac{1}{2}$ pounds.
(Photograph furnished by C. P. Bailey & Sons Company, San Jose, Cal.)

The castrated animal is called "wether," as with sheep. The term "kid" is unanimously applied to the young.

The flesh.—Our correspondents are apart in the use of the terms "Angora mutton" and "Angora venison" for the flesh of the Angora goat, but the greater number of them call it by the former name. Those who pastured their goats upon some grass or clover as well as upon browse, and then finished their fattening with grain, produced a meat so nearly like the best lamb that it required experts to detect a difference; these people use the term "Angora mutton." In other instances, where the animal is fattened by browse alone, there is imparted to the meat a game flavor, which may be intensified or

reduced by the character of the browse; people who use the meat under these conditions call it "Angora venison." As the flesh more nearly resembles that of the sheep than any other, it would seem advisable to call it Angora mutton.

THE USES OF ANGORA GOATS.

A large class of people in some way have become possessed of the opinion that the goat is practically a useless animal. They do not reach conclusions upon investigations, however, and do not discriminate between the different breeds. To them a goat is a "goat," and there the argument ends. Investigations prove that the Angora goats are not only classed among the most useful of the domestic animals, and have been so classed for thousands of years, but their usefulness is manifested in a variety of ways. The fleece, called "mohair," furnishes some of the finest of fabrics among ladies' goods and is used in various other manufactures; their habit of browsing enables the farmer in a wooded locality to use them to help in subjugating the forest; their flesh is exceedingly delicate and nutritious; the milk, though not so abundant as with the milch breed of goats, is richer than cow's milk; their tanned skins, though inferior in quality to the skins of the common goat, are used for leather; their pelts make the neatest of rugs and robes; they are excellent pets for children; a few of them in a flock of sheep are a protection from wolves and dogs; their manure is noticeably helpful to the grass which follows them after they have cleaned away the underbrush. These are all vital subjects of varying degrees of importance, and some of them will be considered here under appropriate heads.

BROWSING AND PASTURAGE.

Ability to clear brush land.—Goats are browsers by nature, and there is no vegetation they will eat in preference to leaves and twigs of bushes. While this fact would at once establish them as an intolerable nuisance in an orchard or garden or any other place where desirable shrubbery is growing, it also shows that they may be of great value in many localities where it is desirable that underbrush be destroyed. They are omnivorous eaters and seem particular to avoid that character of vegetation which other kinds of live stock prefer. Every leaf and every twig within their reach is greedily eaten, even to most of the bushes and weeds that are considered poisonous to other ruminants, while a remarkably few weeds are passed by. They will desert the finest clover and blue grass for such an outlay.

The inherent tendency to climb leads them to hillsides and rocky cliffs, and they prefer such situations to any of a level character. Here nature meets their necessities by dwarfing the bushes so they may be browsed easily; the soil is quickly drained in the event of

rain—for they do not like wet land; and the stones serve to keep the feet trimmed properly by the wearing process. This is the situation that the goats would choose; but the farmer might choose to turn them into a dense mass of brush and weeds anywhere, and they will at once begin to convert it into the most beautiful pasture.

In those localities where valuable land is completely subdued by brush the goats are considered of more value for the purpose of clearing it than for their mohair or meat. They thus become one of the farmer's important tools. Their value in this respect must be measured by the value of the land which they will render cultivable. It is



FIG. 3.—Brush land "before goating."

said that in Oregon, where Chinamen had been paid as high as \$20 an acre for clearing off brush, goats had done the work even better. Sprouts will spring up behind men's work, but goats will keep them down until they cease to appear.

Dr. J. R. Standley, of Platteville, Iowa, kindly furnished the Bureau of Animal Industry with photographs which, as he naively states, show woodland "before goating, during goating, and after goating." Figures 3, 4, and 5 are reproduced from these photographs, and they show better than printed words what the goats can do in this line of brush extermination. Many similar illustrations have recently appeared in

the agricultural papers, and no one has yet ventured to say that the goats will not do all that is expected of them in this work.

The beneficial effect of the goats is not all in the clearing of the land of brush. In many parts of the country nutritious grasses "come in" after the goats have done their work. In the tract shown blue grass has by natural methods formed a most excellent pasture. The final result is that the goats not only put such character of land in condition for cultivation, but actually go further by converting a wilderness into a good pasture, thus preparing the way by cheapest methods for sheep, cattle, or horses.

Dr. Standley says that in that part of Iowa where he lives "100 Angoras to each 40 acres of this land for two years would make it as clean as a lawn and as perfectly set in blue grass as a lawn." He has

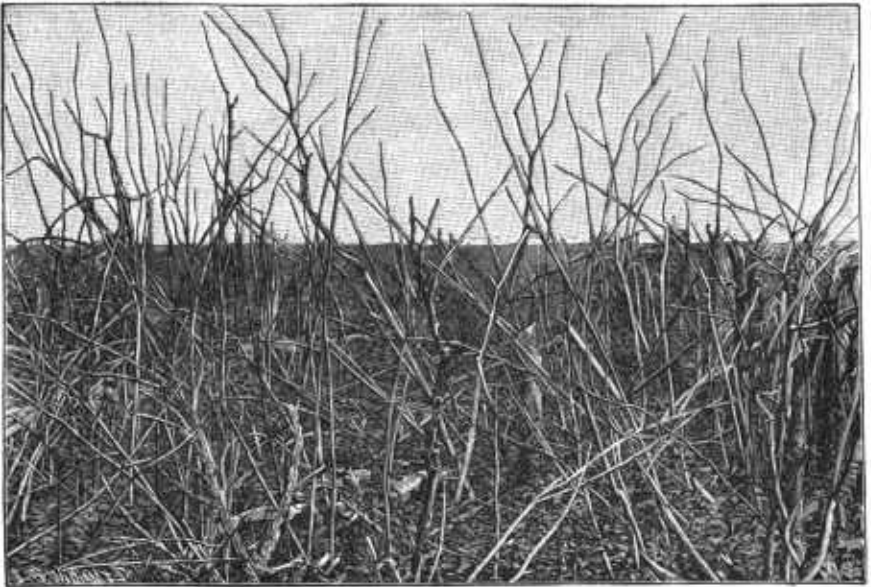


FIG. 4.—Brush land "during goating," after twelve months.

500 acres of such land cleared in this manner. This land now supports one steer to each acre, whereas before it was cleared there was not enough grass on an acre to make a sheep or goat a single feed. The same experience is reported by Mr. Q. M. Beck, of Beargrove, Iowa, who says: "After running them on such lands here a few years we have a fine blue-grass pasture."

Abe Blackburn, of North Yamhill, Oreg., says that he now has a pasture that will keep 200 sheep which did not have grass enough to keep a goose when he turned his goats into it a few years ago. The goats have killed out the brush and the grass has taken its place.

Reports of this kind from all parts of the country could be given here by the hundred.

What kind of browse should they have? is one of the many questions asked. The question is easiest answered by saying that they will live and thrive on any kind, as no variety has been reported that they will not eat. It is not well, however, to confine goats to one kind of browse; no animal enjoys a greater variety of feed than does he. Probably the oak is the goat's preference, but many others might be close seconds. Correspondents of the Bureau were requested to state the kind of browse their goats had, and a summary of their reports shows the following varieties: Oak, cedar, sumac, buck bushes, briars of all kinds, elders, prickly ash, grapevines, ash, sycamore, basswood, hickory, mahogany, hazel, vine maple, willow, rosebush, thimbleberry, service berry, crab apple, haw berry, soft maple, fir, cascara, cherry, alder, salol, poplar, pine, madrona, hackberry, elm, black persimmon,



FIG. 5.—Brush land "after goating," two years.

mesquite, wild plum, grease wood, and sagebrush; also most weeds, including thistles.

Browsing supplements feeding.—The browsing habits of goats is important in connection with the question of feeding. In some places they obtain enough browse to carry them through the winter. This is especially true in the Southwest, where there is so great an abundance of live oak. If snow is on the ground, or for other reasons the goats are deprived of opportunities for foraging, the trees are cut down for them. They pass through the winter in good condition with other feed. Wherever they are deprived of opportunities for browsing they must be fed. Browsing saves feed. As far north as Nevada goats subsist the winter through on sagebrush.

Preserving brush land for browsing.—Up to this point consideration has been given to these goats as a means of clearing land for pasture or for cultivation. There is much brush land in the United States which will support goats but is good for nothing else. If this is to be devoted to goat raising, it is, of course, not desirable that the brush be entirely exterminated. In this event a goat raiser should have several fenced areas and change the goats from one to the other frequently. They should not be permitted entirely to denude one field before they are transferred to another. It is true, however, that no matter how perfectly a woodland may be cleared of brush it will be covered over again with briars and brush in a few years if constant attention is not given it. It is not difficult to overpasture such land, and if the goats adopt the "peeling" practice the brush and trees will have greater difficulty in recovering.

Grass and weeds as pasturage.—Considerable interest has been manifested in the Angora industry in those localities where browse is not available and where grass and weeds form the only pasturage. A great many inquiries of this character have come to the Bureau, and the Bureau, in turn, has referred the matter to the breeders of the country. The replies received have been numerous, and show a difference of opinion. The predominant opinion, however, seems to be that the goats thrive best under the conditions most nearly like those of their original home. It is certainly the best argument to say that goats prefer any kind of browse to the most nutritious of grasses, which is true, and therefore browse is better for them than grass. While the more economical conditions obtain where there is an abundance of browse, there are many flocks in the United States which are subsisting at reasonable cost upon grass alone.

Yet there is always expense in connection with pasture grasses, but there is little or none with browse. One of the chief reasons why goats are receiving so much consideration at this time is that they are practically inexpensive feeders, and so all items of expense must be figured on if profit is to result. Pasturage, unlike browse, is not available all the year through. Therefore, in prairie locations feeding in winter is a necessity. One of the recommendations in favor of Angora mutton is that it has the flavor of venison. This flavor is imparted by the browse, and is absent in the mutton made from grass or grain feed. Many claim that the animals make a better growth among the bushes than on open pastures, and that the quality of the fleece is much better.

Pasturing with other stock.—So far as the goats themselves are concerned, they may be kept in the pastures where there are sheep, cattle, and horses. Their presence is in no way obnoxious to any of these animals. It has already been pointed out that a few of them in a flock

of sheep are a protection against dogs. However, it is not best for the goats that they be kept in pastures with horses. This is especially important if there are kids, as the horses have a habit of playfully chasing any animal that is not large enough to defend itself, and they are apt to strike the kids. It is also important that the kids should not be in pasture with hogs, which are liable to eat them.

Number of goats to an acre.—This is a question frequently asked, but certainly no thoughtful person expects a definite answer. The number will depend, first, upon the object in pasturing on brush land, whether it is to kill the brush or to use it as a permanent pasture; and second, upon the quantity of feed obtainable. While one acre might be as dense as a jungle, another might have small thickets alternating with grass plats. Thus it will be seen that a definite answer can not be given to this question.

MOHAIR.

Quality of the fiber.—The word “mohair” is the technical name for the fiber of the Angora goat which is used in the manufacture of fabrics. The word comes to us, through the Old French “moher,” from the Arabic “mukhayyar,” meaning mohair cloth.

Besides the mohair there grows upon the Angora goat a short, stiff hair, which is technically known as “kemp”—a subject that will be discussed in another paragraph. It is held by some writers that this short hair does not occur on the pure Angora, and that where it does appear it is upon Angoras that have been bred up by crossing upon the common goats; in short, that it is a relic of the common goat. This argument seems plausible at least, for two reasons: First, there is no certainty that any Angora goats now in existence are absolutely purebred, as many years ago the Turkish breeders began the practice of crossing upon the Kurd goats, and thus vitiating the blood; second, it is noticeable in building up a flock by crossing upon the common goats that the short hair is very prominent in the first cross, and gradually grows less as the crosses become higher.

The uses of mohair in manufactures are discussed on page 21 and need not be referred to here. The properties of this fiber which render it desirable are length, fineness, luster, strength, elasticity, and specific gravity, and these are relatively desirable in about the order given. There is no difficulty in securing length and strength, but the other properties must come by the most painstaking care by breeding. Having length, strength, and luster, the manufacturer wants the fiber as fine as can be bred. Good mohair averages about one five-thousandth of an inch in diameter; or, expressed otherwise, 5,000 hairs may be laid side by side in solid contact within the space of 1 inch. (See fig. 6.)

Many mohair growers assert that the quality of the fiber depends

largely upon the climate and the feed; and all are agreed that the fiber becomes coarser as the animal grows older. Schreiner says:

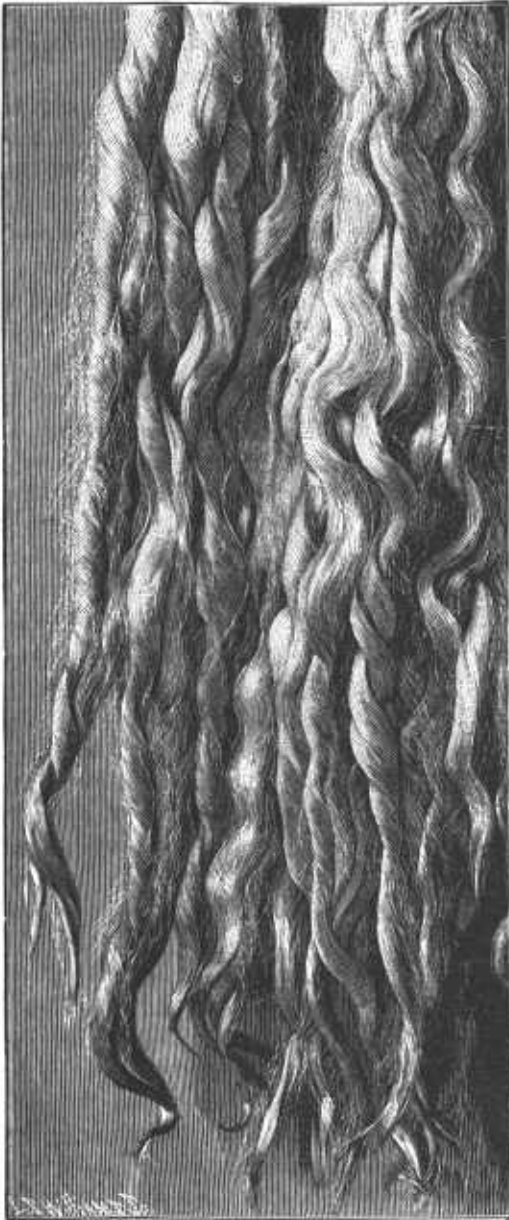


FIG. 6.—Samples of mohair.

If goats are to produce the best fleeces they are capable of, they must be maintained in uninterrupted good condition. They must have a variety of food, principally shrubs and aromatic plants, and lead an active life; they must, if possible, have running water to drink and be kept free from dust; they must not be kraaled (or shedded) except when absolutely necessary; they must have clean sleeping places and must not be crowded together.

The wide range of prices of mohair in the market is due to various causes, but to none so much as the unevenness in quality of fibers. As compared to the total production in the United States, the quantity of first-class mohair is exceedingly small. The tendency has been to breed for length of fleece and size of animal. While both these qualities are desirable, it ought to be plain to anyone that profit does not lie in these directions wholly.

Mohair in a general sense is an expansive term, covering the fleeces of goats of various Angora crosses.

The fleece from a cross between an Angora buck and the common "nannie," although scant, coarse, and of uneven length, is unfortunately called mohair, just the same as that from the best animal. The fleece of the second cross is

better, and that of the fourth and fifth crosses very good, provided, always, that first-class bucks have been used. The complaint of the manufacturers is that very little first-class mohair is produced in the United States. It has been demonstrated, however, that a first-class fiber can be produced here, and the breeder having judicious foresight will undertake to produce a greater supply of it.

Mr. George B. Goodall, of the Sanford Mills, Sanford, Me., points out, in a recent letter to the Bureau, the defects of the American-grown mohair taken as a whole. His mills consume more than a million pounds of mohair annually, some being the domestic product and some the Turkey product, and thus he speaks from large experience. He says:

Before the domestic mohair growers can expect to get anywhere near Turkey prices they must do away with kemp and aim for a fine stapled hair instead of breeding for coarse, heavy fleeces, as many do. The coarser the fiber, the lower the value to the spinner. We often get small shipments of domestic fleeces as choice and fine as those grown in Turkey, which goes to show what can be accomplished with care and brains. The trouble is more with the grower than with the goats and the climate, for what one man can do another can do.

There are in these quotations hints enough to point the proper course for those goat raisers who desire to make their mohair crop a paying one. If an Angora goat is of most profit in clearing land of brush (as is the case in some localities), his work will be done just as well if he produces at the same time a first-class fleece; thus he may become more valuable. There is no reason why Angoras should have the preference for such work over the common goats, except that they may be profitable in other respects at the same time; therefore the better the fleece produced while destroying brush, the greater the value of the goats.

Influence of age and blood on fiber.—Reference has already been made to the fact that the fiber becomes coarser as the animal grows older. The fiber is also coarse upon younger animals of the lower crosses. The best fiber grows upon the animals of best blood; and among these that upon kids, yearling wethers, and does, in the order named, is preferred. The best fiber is usually very curly, in ringlets rather, but not kinky. It loses its curl and becomes thinner on the goat, coarser, and straighter as the animal grows older.

The weight and length of fleece.—The weight of the fleece is always a subject of inquiry and is a difficult question to answer, because of the controlling circumstances—such as climate, feed, care, and, above all, the degree of Angora blood in the animal. The briefest answer, and probably the best one that can be made in a general way, is that of Mr. C. P. Bailey, and is as follows:

Half-breed goats scarcely shear enough to pay for the shearing; three-fourths-bred goats shear 1 to 1½ pounds, worth 15 to 20 cents; seven-eighths-bred goats shear 2 to 3 pounds, worth 20 to 30 cents; fifteen-sixteenths-bred goats shear 3 to 5 pounds, worth 30 to 40 cents.

He adds the important statement that the fourth cross, or fifteen-sixteenths, is the lowest grade that he would use exclusively for mohair.

It would be a difficult matter to state what is the average length of an annual fleece, but 10 inches would probably not be much out of the way. There is on record an account of mohair measuring 20 inches. Mr. U. S. Grant, of Oregon, reports a buck with a fleece 19 inches long (fig. 1). In the southern part of the country, where shearing is done twice a year, the fiber must necessarily be shorter. This is a disadvantage, as the spinners prefer a long fiber.

Schreiner says that the goats must not be crowded together in quarters if the best fiber is to be obtained, and Hoerle says that "goats running together in small herds will shear from 25 to 40 per cent more than when running in large herds."

Kemp.—The term "kemp" used in connection with mohair refers, in a collective sense, to the coarse hair of the goats, and is especially noticeable in the lower grades. Hoerle says: "Kemp is the coarse, dead-looking hair all through the mohair, about 2 to 4 inches long, which I consider to be the degenerated remnants of the long, coarse, dead-looking outer coat of some common goats. It is usually thickest on the hind quarters of badly bred goats." Its presence in mohair always reduces the price in proportion to the amount that is present. The reasons for this are various—the hair is coarser than the mohair; it is lusterless; it is of various short lengths and must be removed, in doing which there is a heavy loss of mohair; and it will not, except to a limited degree, take the dyes used for mohair. This last statement is a striking fact and ought to be the means of prompting the mohair growers to strive to breed it out. Whether or not it can be done entirely is an open question, but it is believed by many prominent breeders that it can be done. Schreiner, however, considers kemp a part of the fleece that can not be eradicated completely.

In a recent article in the *Oregon Agriculturist*, Mr. George B. Goodall says:

A majority of the mohair growers in this country little realize how much kemp has to do in keeping down values of their clips. If they could spend a few hours in our sorting and combing rooms the lesson learned would be of great value to them—more than could be obtained by reading. In watching the combs at work they would notice some making 5, 10, or 12 per cent of noil, or waste, while others will be taking out 30 or 40 per cent. Ask the comber the reason of this and he will reply that one lot has a much larger amount of kemp than the other. One fiber of kemp takes out five or six good fibers which should go into yarn. It may not generally be known why kemp is such an objection, but when we state that it will not take color, but remains nearly white in the goods after passing through the dye-bath, you will understand why I write so strongly on this point. If you want to form some idea of how a fabric looks made from kempy mohair yarn, just look at a man's hair that has commenced to turn gray, especially dark or black hair.

Other undesirable features.—The very short hair, mane, kemp, and the hair that has been cut twice in shearing are, together, called noils,

and this must all be combed out before the mohair can be spun. The noilage in Turkish mohair is only 15 to 20 per cent. In our domestic product it runs as high as 40 per cent. Noils are worth only 14 to 16 cents a pound, the same as short wool for blankets.

In some sections of our country, where the climate is dry and the soil distinctly alkaline, the natural animal yolk disappears from the mohair, leaving it dry, frowsy, and harsh. The dust of the fine alkali soil penetrates the fleece, so that much of the mohair grown in those sections is loaded with it, amounting in some instances to 40 per cent in weight.

Markets and factories.—Two of the questions which the mohair producers were asked to answer were: "Do you have any difficulty in disposing of your mohair?" and "Where do you market your mohair?" The answers to the first question were all firmly in the negative except in one instance, where an Arizona producer replied: "I have no difficulty in disposing of my good mohair, but my short and kempy stock goes slow and at a low price (23 cents)." There is much encouragement in these replies to those who may fear that the markets may not demand the supply. The ingenuity of the manufacturers in working the better grades into woolen fabrics and the finest of furniture plushes and the poorer grades into plushes which make good car seats, horse blankets, hats, etc., has, no doubt, opened the way for the consumption of all that may be produced.

As to factories, there are more than a sufficient number in this country to manufacture the product; in fact, many of them do not attempt to use mohair for the reason that the supply is so limited. These factories of the United States are all in the East, and the principal market for the mohair is New York. The marketing center of the world is Bradford, England, where practically all the product of Cape of Good Hope and Turkey is sold.

Very few of the mills will purchase direct from the producer. They find it preferable to buy from the commission merchant, as he separates and classifies the fleeces, and the purchaser is saved this trouble. A few producers ship their mohair to Boston, and others, especially some of those in the Northwest, sell to commission men in Portland, while others of the West sell in San Jose, Cal.

MANUFACTURES OF MOHAIR.

One of the reasons why the mohair industry has lagged so in this country during the fifty years since the introduction of Angora goats is that the use of mohair goods was subject to the caprices of fashion. It would not be strictly correct to say that the industry has even got beyond the influence of fashion, but it is at least nearly so. There is now a steady demand for the product of our country, and much is imported besides. Dame Fashion is still whimsical toward all-mohair

goods, especially dress goods, but the mohair is mixed with other fibers for producing fabrics of strength and luster, and the home supply is not nearly equal to the demand. Because of the limited and uncertain supply, some mills which have at times used mohair no longer attempt to secure it. They are prepared to use it as soon as the supply will warrant the undertaking.

Mr. George B. Goodall, president of the Sanford Mills, Sanford, Me., who has kindly furnished the Bureau with valuable information, states that his mills consumed 840,000 pounds of domestic mohair and 460,000 pounds of Turkish mohair in 1899, a total amount of 1,300,000 pounds. While these mills are believed to be the largest consumers of the domestic product, there are thousands of pounds consumed by other mills (see p. 46).

Only a small percentage of the domestic product of mohair is of superior quality, as has been shown in previous pages. The greater amount is of inferior quality from various causes: First, the fleece from the crosses, beginning with the first cross, is called mohair, and is indeed worth something; second, all of the crosses up to the fourth or fifth have a great deal of kemp in the fleece (it never disappears entirely from any cross); third, efforts have been directed too persistently toward producing a large fine-looking animal, the fleece being a secondary consideration; fourth, the staple, when of superior quality, is often too short.

Many grades of mohair are mixed with silk and wool in a large variety of fabrics in which it formerly was not used. It is made into dress goods known as mohair, and much of what is usually called alpaca is nothing less than mohair. The fine fabric called camel's hair goods is also of the best mohair, and not from the camel, as we would suppose from its name. "Chamal" is the Arabic word for camel, and the Arabs called the Angora goat the chamal. Mohair braids contest the markets with silk braids and are never out of fashion. The ways in which it is used with silk and wool are numerous. It adds to these fibers not only its brilliant inherent luster, but great durability as well.

Mr. William R. Payne, an authority, is quoted below on the uses of mohair:

The most important product of the Angora is the long, silky, wavy fleece, used either pure or in connection with wool, silk, linen, or "carlton" in a variety of fabrics for house furnishings and ladies' goods, brilliantines, linings, braid, plushes, astrakhan cloth, furniture coverings, curtain material, knit goods, fancy effects in shawls and dress goods, and numerous other textiles. * * * The short, low, and crossbred hair is used for blankets, lap robes, rugs, carpets, and low goods generally, but even then is worth more per pound than most sheep wool, varying from 10 to 21 cents per pound. The uses for mohair are increasing every year, and new outlets are being found for it as manufacturers are advancing in the variety of their products.

THE MEAT AND THE MARKETS.

The meat.—In building up a flock of Angoras from common goats (a subject which is discussed elsewhere) the males must not be permitted to grow into bucks of breeding age; and even among the high grades there are comparatively few bucks that should be retained as such for breeding purposes. They should be castrated early. The great majority of these wethers, especially if they are of the first or second cross, do not produce sufficient mohair of good quality to warrant flock raisers in keeping them. These should be converted into meat as soon as large enough. Those wethers and does which produce a fair quality of mohair may be retained for that purpose for a few years and then killed for meat. They are not, however, so good for this purpose as the younger animals.

There is a deep-seated prejudice, as has already been stated, against the use of goats of any kind for meat. This is founded upon ignorance rather than experience. The most ill-smelling "billy" of the worst possible type is by many made the standard of goat meat for the whole of the goat family. As far back as Abraham's day we read of goats being used for meat (very likely Angoras), and this, too, when there were many cattle and sheep. Certainly no prejudice existed against them at that time.

There is not much to be said about the meat of the common goat. It is not so generally used as that of Angoras. The flesh of their kids is considered very fine, and in some sections of the country goats of all ages are killed for meat. There are comparatively few common goats in the United States, and no attempt is being made to put them upon the market. The current report that goats are sold to the packers in the large cities for canning purposes is true in the main, but refers to the Angora grades. The discussion of this question in this paper deals with the Angoras of all grades.

The flesh of the Angora is exceedingly nutritious and palatable. Shropshire lambs, which are considered as among the best kinds of meat, are said not to be superior to a well-fed and well-cooked kid. In the Southwest these animals are as readily sold for meat as sheep, and the market has never been overstocked. A gentleman in Texas found a ready market for his canned Angora mutton, but was compelled to close his cannery because the supply of goats was not nearly sufficient to supply the demand. In the Northwest the principal use of the Angora is for clearing bushy land, and consequently they are not so extensively used as food. However, in nearly every locality there some have been killed for mutton, and there has never been a derogatory statement concerning its quality, so far as the writer is able to learn.

In Cape Colony it is said that the old does are slaughtered to furnish meat for farm hands and young wethers are sold to butchers in the town. In California many miners purchase Angora wethers in preference to sheep wethers for salting down for winter use, because, as they state, the Angora contains less fat, is more easily kept, and is just as palatable.

The markets.—One of the first questions to be considered by a man who is about to embark in stock raising of any kind is the markets for his surplus. This question is first because it is the principal one and all important. The one who proposes to begin with a flock of thoroughbred or high-grade Angoras, such as will yield merchantable mohair, will not need to consider markets, as the increase will be employed to produce mohair; but a large number of flocks will be built up in the future, as they have been in the past, by the use of does of the common breed. This method will necessitate getting rid of every wether for two or three years. All does, of course, are kept for breeding with purebred bucks. It will be ascertained that the fleece of low grades is barely worth the cost of clipping it; that the skin is not so valuable for leather as that of the common goat; and that, as a rug or robe, the pelts are not so valuable as those of the higher grades. Therefore, if there is to be any profit from this part of a flock, there must be a market for the meat.

So many questions concerning this phase of the industry have come to the Bureau of Animal Industry that, in collecting data for this paper, it was decided to go beyond the newspaper accounts and ascertain the facts from the actual producers themselves. The question submitted was, "Do you have any difficulty in disposing of your surplus Angoras for meat?" The answers have been invariably in the negative. It should be said, however, that in the Northwest very few are used for meat. They are considered more valuable there as brush destroyers. The conditions obtaining there are not found in all localities where Angoras are raised. In many places Angoras will be kept where, instead of permitting them to destroy the brush utterly, efforts will be made to preserve brush pasture for them, while in the Southwest they are not all required for destroying brush, and thousands must be sent to market.

The reason why goats are not seen oftener in the market reports of receipts and shipments is that they pass as sheep. It is stated, however, that increasing numbers are seen in the larger markets. In the Union Stock Yards of Chicago as many as 8,000 were received in one week in 1899.

While the goats pass as sheep, they are also sold to consumers as sheep. They have not yet brought as good prices as sheep, and it can not be hoped that they will do so until there is the same demand for their mutton, which will come as soon as the prejudice against goats disappears. The difference is very slight in some places. In Kansas

City, for instance, the sheep bring about one-half a cent per pound more than goats. The packers buy them as goats and sell them as sheep in the form of dressed meat or canned.

THE MILK.

The Angora is not primarily a milch goat, and is not often employed for that purpose. The information at hand indicates that the quantity of milk given by an Angora doe is uncertain, and only in exceptional cases does the amount approach that given by the established breeds of milch goats, such as the Toggenburg, Malta, and Nubian breeds. Some of the records of the earlier importations of Angoras into the United States show that some of them were milked with success. At this time, however, they are not recommended as milch goats; they are more useful in other lines. It is stated upon the authority of some of the oldest breeders in the country that the likelihood of finding a good milch goat among the Angoras diminishes as the grade of the goat is raised. The milking qualities evidently come from the side of the short-haired goats.

The quality of Angora milk is said to be equal to that of any other breed, and more nearly equal to human milk than that of any other animal. For this reason it is considered the best substitute for mothers' milk for infants. An analysis of goats' milk for the British Goat Society, with an analysis of cows' milk for comparison, is shown in the table below. It should be stated that the cows' milk was from a cow which was a winner at a dairy show.

Comparison of analyses of goats' milk and cows' milk.

Element.	Goats' milk.	Cows' milk.
	<i>Per cent.</i>	<i>Per cent.</i>
Water	83.21	87.56
Butter fat	7.30	3.63
Casein	4.18
Milk sugar	4.10	8.81
Ash	1.21
Total	100	100

The milk has an additional value in that the animal is practically immune to tuberculosis. Less than a dozen cases of tuberculosis in goats are recorded.

THE SKINS.

The use of Angora skins, other than for robes, rugs, and trimmings, as described below, is not very extensive. The skin is of a more delicate constitution than that of the common goat, and so does not make such tough leather. While the skin may be taken as an item of salvage from an animal that has died or been killed for meat, it would

not be profitable to raise them for leather alone. If such skins happen to have a good fleece upon them they will be worth more for robes or rugs, but even then they would not be profitable alone. There must be other sources of profit in addition to the skins. Angora skins are manufactured into morocco for use in binding books, and excellent gloves are made from them which bring from \$1 to \$1.50 per pair.

An impression is widespread, based upon immature consideration, that Angora skins may soon supplant the great number of goatskins which we now import for leather, but the quality of the skin precludes any such possibility.

Hides should be kept clean and should be dried in the shade; sun-dried hides are worthless. If the skins are to be tanned soon after being removed, they may be salted. If they are not to be tanned soon, they should be dried.

ROBES, RUGS, AND TRIMMINGS.

Angora pelts are used quite extensively as carriage robes, and they make up into very handsome ones. There was a time when the buffalo, the wolf, and other wild animals supplied the demand for robes in this country, but the extinction, practically, of the buffalo and the great scarcity of the other animals has forced us to look elsewhere for substitutes. An effort is being made to substitute hides of the Galloway and Polled Angus breeds of cattle, but their high cost will prevent their extensive use.

These conditions have resulted in a greater demand for Angora skins for robes. The skin is sufficiently tough for the purpose, and the fleece is easily dyed any desirable color. This characteristic has enabled unscrupulous dealers to sometimes pass them off on purchasers as the skins of some rare animals. In their natural color, the whiteness and brilliancy of which can not be excelled, the skins of the kids and younger does are made up into robes for baby carriages. There are probably a greater number used for this purpose at the present time than in any other way.

As a general statement it may be said that Angora pelts are worth from \$2 to \$3. The real value depends upon many things—such as the size of the skin, the length of the fleece upon it, and the time of year that it is taken.

As rugs these skins are found in many households, and they are both ornamental and durable. They may be used in their original whiteness, or be dyed any color to suit. Their softness makes them very desirable.

They are extensively used for trimming for children's cloaks and coats. Some first-class skins have brought as high as \$18 apiece for this purpose.

ENRICHMENT OF LAND.

The enrichment of land from the droppings of goats is decidedly noticeable wherever they are kept for a year or more. This factor is of no small importance where goats have been employed to clear the brush from land with the object in view of turning the land into grass pasture. Such land, especially if hilly and rocky, is usually in need of fertilizers of any kind if cropping is to be attempted upon it. The manure of goats and sheep is about equal in value. A California firm has been selling Angora manure for fertilizing fruit trees and lawns for several years. They get \$6 a ton (delivered) for it in car-load lots. Manure is considered as one of the resources in the best system of modern farming, and it should be taken into account by anyone who is keeping goats or contemplating doing so.

THEIR USE AS PETS.

The purebred Angoras are very graceful, and their beautiful shaped bodies and fine silky hair make them very attractive. There is no animal, except possibly the horse, that is more beautiful than these goats, and no animal is more cleanly in his habits. As pets for children they are very popular, if they can be kept where they will be harmless to vegetation and anything made of cloth. They have all the propensities of the common goat for destroying fruit trees and chewing any kind of cloth and of climbing upon roofs. All kinds of goats are mischievous in the extreme. The Angoras are tractable and are often harnessed to carts, as are common goats, and their beauty makes them more desirable for this purpose.

LOCALITIES ADAPTED TO ANGORA CULTURE.

CLIMATE.

So far as temperature is concerned, no place has been found that is too hot or too cold for Angoras. Although not partial to heat, they will stand it quite as easily as sheep. Shade is essential to success if the sunshine is very warm.

The climate in Angora, where the breed originated and is still supposed to flourish in its more perfect state, is extreme. A temperature as high as 85° F. is registered in the summer and as low as 0° F. in the winter. In Cape of Good Hope, where they are thriving well, the temperature goes higher in the summer, but not so low in the winter. The United States presents a wider range of temperature, where, in southern Texas and New Mexico, it may go above 100° F. in the summer, and in Idaho as low as 30° F. below zero in winter. The range of localities where Angoras have done well is from Guadaloupe Islands,

in the Lesser Antilles, to Ukamak Island, belonging to the Alaska Peninsula. Mr. M. L. Washburn, superintendent for the Alaska Commercial Company at Kadiak, says: "On Ukamak Island we have a flock of Angora goats, which have increased 60 per cent a year since they were placed there. They have given very good results in mohair, which is of good quality and fine texture."

In considering Angora culture it is of more importance to study the climate with reference to moisture than temperature. It should be remembered that the original home of the goat is high up in the mountains, where the air is not laden with moisture. Under like conditions it thrives best here. Lowlands that are wet or marshy are not at all suitable. The effect of such situations soon makes itself apparent in a flock of goats. Foot rot is apt to give endless trouble, and the feet will need much attention in other respects. Therefore lowlands with much moisture and high temperature are not recommended for goat culture. It is a historical fact that the first effort to transplant the Angora goat outside of Asia was a failure on account of these conditions. This was in 1554, when a few individuals were taken to Holland, but they soon died, owing to the moist climate.

The effect of climate has a great deal to do with the character of mohair. On this point Mr. John S. Harris, of Oakley, Idaho, who is a gentleman of much experience, is quoted:

Mohair grown here in Idaho is very bright when scoured, and, owing to the electric currents which exist in the air, the hair possesses elasticity, a property requisite to mohair. Goats do not grow a long staple here, but owing to the cold it is very dense. Neither do they grow so heavy a fleece as in a milder climate, owing to the dryness of the air. Plenty of green, natural herbage the year round would produce a heavier fleece and ultimately deteriorate its quality.

A high altitude is a locality always preferable in goat culture. This is especially true with Angoras, as the climate in high altitudes seems to have a beneficial effect upon the mohair.

SOIL.

Almost any kind of soil, except wet and marshy land, is suitable for these goats. Their preference is mountainous or rocky land, where they find it necessary to climb mountain sides and rocky cliffs to browse. Such situations not only afford them satisfaction in climbing and feeding, but the rocks serve to keep the feet trimmed. This is an important matter, for on soils devoid of stones or sand the feet must oftentimes be trimmed by hand.

One of the reasons for the freedom of goats from most diseases is that they require pure water, and in no place is better water found than in the springs and rivulets of hilly or rocky localities. Goats also require much exercise, much more than sheep, and such situations satisfy this inclination.

However, it must not be understood that rocks and hills are essential, although they provide for the goat an ideal situation. As stated above, almost any kind of soil is suitable except wet and marshy land. Goats are not partial to water in any form—in the soil or in the form of rain, snow, or sleet—and they drink a very small amount. Keep the goats dry overhead and under foot.

THE CARE OF ANGORA GOATS.

The preceding pages have no doubt given the impression that Angora goats are very hardy, and, indeed, it is true, especially if their foundation is upon crosses with the common goat; but this should not be taken by the careless or shiftless man as a license to subject his goats to all manner of discomfort with the expectation that the results will be fully as satisfactory as if rational attention were given them. That these animals can withstand extreme cold, such as that of the islands of Alaska, or extreme heat, such as that of Guadeloupe Island, is strong evidence of their fortitude and of their adaptability to a wide range of temperature under proper care. The same fortitude is exhibited by horses, cattle, sheep, and hogs, but no one thinks of turning these domesticated animals out upon their own resources, as wild animals are forced to exist. That they can subsist upon vegetation which is utterly useless for any other purpose is evidence simply of their economical keeping; it does not permit one to conclude that they never need any other kind of feed. In a word, it is intended here to impress the fact that, if satisfactory results are to be obtained in goat-raising, the animals must receive the same rational treatment that is received by other live stock when best results are sought. The goat is a hardy animal in the fullest sense of the word, but this characteristic only enables him to respond the more quickly and satisfactorily to careful treatment.

HERDING AND FENCING.

Goats require a great amount of exercise, much more than sheep. The one is by nature a browser and the other a grazer, and the browsing habit naturally requires more activity on the part of the goats. They are sensitive to restraint and do better if not herded, but of course herding is often a necessity, and therefore should be done under as favorable circumstances as possible. So far as possible they should not be allowed to feel their restraint. If constant attendance is necessary, the herder should be of quiet disposition. The next best thing to the freedom of a range is a large pasture, where the goats may have oversight, but not constant attendance. Such pastures are considered the cheapest method of keeping these goats. They can easily be trained to come home by feeding a little and salting regularly at home.

The fencing for pastures is a matter which early concerns one who contemplates going into the business, for it is the current belief that goats will climb onto any shed of ordinary height or jump a fence that will stop other animals. While they will climb anything that is built in such a manner that it may be climbed easily, they will not jump any ordinary fence. They will, however, creep through if there is an opening large enough. The old-fashioned "worm" fence, especially if it leans outward, will not stop goats. The angles in such a fence are an incentive and a delight to them. Indeed, there are many hogs that will go over a fence of this kind.

In building a goat fence there are other matters to be taken into account than simply that the goats shall be kept in. The animals themselves (especially the young ones) must be protected from dogs and wolves from the outside. In the Southwest it is much more important to fence to keep vermin out than it is to fence to keep the goats in. So the double object must be kept in view in building a goat fence. Such a fence must be dog proof, hog proof, and wolf proof. A hog at liberty which has once had the taste of chicken or lamb or kid is a greater nuisance than any wolf or dog, and should be dispatched as being an enemy to other young live stock as well as kids.

One correspondent of the Bureau constructs a fence of ten barbed hog wires, with posts set 20 feet apart, having three stays between the posts. The lowest wire is only 1 inch from the ground; the next four wires $3\frac{1}{4}$ inches apart, and one-half inch added to every space above. It is necessary that all the wires should be kept very tight. This correspondent adds the interesting note that many wolves are killed by screw worms in wounds received while attempting to crawl through such a fence. A good fence may be made of woven wire 3 feet high, drawn on the inside of the posts, and a closely barbed strand of wire 3 or 4 inches above fastened to the outside of the posts to prevent animals from jumping in. A straight rail fence, if the rails are laid close enough, as well as an ordinary board fence, will turn goats.

Mr. Jobson says that a five-board panel fence 4 feet high is sufficient for goats. He also says that zigzag, or worm, fences are an incentive for the goats to climb, and that they will walk along the top of such fences as easily as on the ground.

If they are permitted to climb onto the roofs of buildings it will not be long before they will have them completely ruined.

SHELTER AND PENS.

A shelter is necessary during wet spells, and more especially if the rain is cold or in case of a sleet storm. Dry cold alone has little or no injurious effect after the kids are three or four weeks old, and they will even frolic in the snow when the mercury is at zero, and sleep

with apparent comfort in an open shed. With their dense covering there is no reason why this should not be true; but this same dense covering, when soaked with cold water or driven full of sleet, is a deadly menace. Goats will not get wet if they have an opportunity to avoid it. They appreciate a shelter and will always seek it at night, and during the day in the event of storms. They are said to be excellent barometers, being able to foretell stormy weather, and always contrive to place themselves under shelter before the advance of a storm, if possible. Mr. Diehl says they will run miles to avoid an undesirable rain.

Goats should not be left on the range or in pasture over night. The latter is practiced to a considerable extent, but experience has shown that they are safer in closer confinement during the nighttime.

The pens in which the goats are kept at night should, above all things, be in such a location that they can be kept dry by drainage. Other live stock should be excluded, as they would only help to trample the ground into mud. They should have a dry place to stand and sleep, for they are apt to contract rheumatism in the knees. There would be little use in raising Angoras for their fleeces if they are compelled to wade through mud and filth, or be confined under these conditions. The fleece would soon become so soiled and matted as to be a "burden unto death."

The sheds provided for their shelter must be of a size to give an abundance of room. The goats should not, under any circumstances, be huddled together. If they are thus crowded in cold weather they will pile up, with the result that some of the younger ones will die from suffocation. One writer states that he has known as high as 30 being killed in this manner in one night. Mr. Oscar Tom, of Angora, Oreg., describes a shelter that proves satisfactory in the following language:

The sheds should have eave troughs, and be boarded down to within 3 or 4 feet of the ground. There should be a ditch around the shed to prevent any water from running into it, and it should be open all around, so that the goats would not have to wait for others ahead of them to go in; a few cross ones could not block the way and keep other goats in or out, and the rain would not blow in, but the goats would have plenty of fresh air. There should be a good fence around the shed at a distance of at least 50 yards, to keep cattle and horses from trampling up the ground and working it into mud. Have the fence high enough for the goats to go under, but never allow hogs to run into the goat shed, for goats are easily frightened after dark.

In some parts of the country the strong winds will blow rain under a shed such as Mr. Tom describes. In such cases the side from which these storms usually come might be boarded to the ground. A better plan, in the opinion of some, is to have a few solid movable panels of fence to place around the openings of the shed on such occasions. This plan is convenient, too, as the panels may be taken away in fair weather, thus permitting a free circulation of air from all sides.

Shelter from the sun's rays should be provided for summer time. Although goats are able to withstand intense heat, they do not thrive well when subjected to it. For this purpose sheds more open than that described above are preferred, for the reason that the air will have freer circulation. Better yet than a shed against the sun's rays are large trees. In this case there is no obstruction whatever to the air.

FEEDING.

The principal reason why goats will be raised instead of sheep in some places is because they are practically inexpensive so far as feeding is concerned. This phase of the subject is quite fully discussed under the head of "Browsing and pasturage" (p. 12). They eat the leaves in summer and the soft twigs in winter, and if there is an abundance of either they will not require anything else to sustain life; but this condition exists only in certain localities, and other means must be adopted elsewhere. They are fond of straw and fodder of any kind.

Notwithstanding the ability of goats to subsist upon coarse fodder in the winter season, the impression must not be held that they will thrive well upon it in the absence of browse. They will extract from these fodders all the nourishment obtainable, which is not very great, but must receive some supplementary feed. Any kind of grain will answer this purpose. Probably the best feed is oats, and if it is sheaf oats better still. In Texas some of the large goat raisers feed cotton seed by scattering it upon the snow so that goats will have to exercise somewhat in picking it up; besides, the time consumed in picking up the seed thus scattered insures better mastication.

In feeding grain care must be taken not to make the supply too liberal, unless the object is to fatten for slaughter. Goats easily become lazy on a plentiful supply of grain and will decline to go out to feed upon the brush. This is an important point, as their hardiness to a large extent is attributed to their feeding upon browse and to the resulting exercise.

As to the coarse feed for winter use, straw is eaten with relish; corn fodder is better and more nourishing; clover and alfalfa hay are excellent. Indeed, very little grain will be required where either clover or alfalfa hay is provided. Mr. Hoerle says:

The quantity of food necessary to keep them in good condition varies according to the climate, but one-fourth pound of corn or its equivalent in other grain and 1½ pounds of hay at a ration is about a fair average. With abundant winter pasture this ration once a day (in the evening) is sufficient; if the pasture is scant, they ought to have it both morning and evening, and on wet, cold days, when they are kept in the sheds all day, feed them three times or make their rations correspondingly larger. They should be taught early to eat their hay chopped, moistened, and sprinkled with bran, oil meal, or corn meal, which, if it digests easier if given in that way, will save about 20 per cent of the feed. They should also be taught to eat ensilage where practicable.

Sugar-beet pulp has been fed with success. The goats must be taught to eat it, but after once learning they seem not to be able to get enough.

In feeding either hay or grain absolute cleanliness must rule, as goats will not eat soiled food. There is no animal more particular about his food than the goat. He has no inclination for mud or filth in which to stand or walk, much less having to pick his food out of it. Bryan Hook, author of *Milch Goats and Their Management*, says:

The goat is of all animals the most fastidious in the matter of the cleanliness of its food, refusing, even though ever so hungry, to eat food that has been soiled or trodden under foot. For this reason a rack should be provided for the hay, and only as much given at each meal as the animal will consume, for that which has been trampled under foot will ever after be rejected, even though carefully collected and replaced in the rack.

When the production of mohair is reduced to a fine art, the question of feed will receive the most careful consideration, because of its influence upon the fiber.

SALTING.

Goats require more salt than sheep, owing to the more astringent character of their food. If loose salt is used, the general custom is to give it once a week on regular days. If rock salt is used, it should be placed where the animals can get to it at any time. Rock salt is preferable, as it can be placed in boxes or troughs raised from the ground, and thus be kept out of the dirt and be of easy access to the goats at any time; and, too, there is no waste and no danger that the animal will eat too much of it.

MARKING.

The question of marking is always proper. Several devices are in use, but the metal tag in the ear is probably best known. A practice which appears to give satisfaction is to tattoo the numbers into the ear, using indelible ink. It is found that the metal is sometimes pulled out by brush.

KIDDING AND THE KIDS.

The kidding time is the most important in the life of the goats. For two or three days after the kids are dropped they are exceedingly delicate, and there will be no future success unless good care is given at the time. They can not "rough it" at this period, but will die from very little exposure or neglect. They are more delicate for a few weeks than lambs. When the kids are large enough to follow the flock they have constitutions stronger than lambs of like age and are able to care for themselves very well.

The proper time for kids to arrive is in the spring, about the time when leaves start on the trees and bushes. At that time there is milk-producing food for the doe, and the weather is also warm enough to

favor the kids. The exact time may be governed, of course, by the service of the bucks and will be earlier in localities where the seasons are earlier. If kidding comes in cold weather, there will be greater difficulty in saving the kids. Warm stabling must also be provided, and the does will require extra feeding in order that they may supply milk for the kids.

A few days before a kid is due the doe should be separated from the flock. Some breeders would put her in a pen alone, while others would put as many as 20 in one pen. If the facilities are at hand, a small pen for each doe is better, for the reasons that the doe will sooner "own" the kid and there will be less danger of injury than if among a number. A doe knows her kid by the sense of smell, especially when it is young. This characteristic is so strong that some breeders assert that if two kids of different mothers are rubbed together, the does will often refuse to own them. Whoever cares for the doe at kidding time will find it an important part of his work to see that the does own their kids. This difficulty in any case will disappear in a few days, and it will then only be necessary to arrange for the does to get to the kids whenever they desire.

If kids are dropped on the range or in the pasture, they must be carried home and special care given to see that the does are made to own them, for many times they will refuse. A lamb will follow its mother very soon after it is dropped, but a doe will hide her kid as best she can in bushes, or behind a stone or log, and leave it there while she goes away to feed; and on her return she expects to find it where she left it.

The Mexican method of handling the kid is largely practiced in Texas and New Mexico and consists in "staking," or "toggling," the kid. When the kid is dropped, take it to a protected place (shed or barn), seeing to it that the doe follows, and "stake it out" or "toggle" it with a string about 14 inches long. Tie this string to one leg, changing occasionally to other legs to avoid lameness. This string should have a swivel in it to prevent twisting, and the kids should be carefully watched so long as they are so tied, which will be from seven to ten days.

The does should remain with the kids until they leave them of their own accord to go out for feed. The kids may then be allowed to run loose in a pen together until they are large enough to go out with the flock, which is when they are from four to six weeks' old, or when they are able to jump a board from 12 to 20 inches high placed across the gate. The height of this board restrains the kids that are too small to follow the flock and at the same time enables the does to go and come as they please. W. G. Hughes & Co., of Hastings, Tex., have a device for separating the does from the kids which is better than the board. It is a bridge, either end of which drops to the

desired height. This device enables the does to go out and in without injuring the udder, which is apt to occur where they have to jump a board.

The following is from "California Angoras," published by C. P. Bailey & Sons Company:

There are in use two methods of handling kids at kidding time, namely, the corral method and the staking method. Each of these has points which render it most valuable under certain conditions and in certain localities.

The Corral Method.

This method may be used with any number of goats. With various modifications and adaptations which best suit the size of the flock, the climatic conditions, the facilities for feeding, etc., it may be used by the beginner with success. We have practiced this method in Nevada for more than twenty-five years. If the herd is a large one, say 1,000 head, three men are required to handle the goats at kidding time. The service of the bucks is so managed that the kids will be dropped gradually through several weeks. At the height of the season we expect from 75 to 100 kids a day. The season lasts about thirty or forty days. Fortunately most of the kids are dropped in the day time.

We have four or five small corrals, fenced with 36-inch woven wire and large enough to hold 50 does and their kids. The doe should be allowed plenty of room, because if too close to her neighbor she may adopt the other doe's kid. Besides these small corrals, two large ones are needed, each large enough to handle 1,000 does. Along the fence of one of these corrals are a dozen small pens just large enough to hold a doe and kid. At the gate of this large corral a jump board is placed. This jump board is intended to keep back those kids which are not large and strong enough to jump over it. A 2-inch board about 18 inches high will answer the purpose. Another device sometimes used is a platform open at the end, so that the kids may run under it and thus avoid being trampled upon when the goats are going out over the platform.

The small corrals may be made of panel fence and located in a meadow where some feed is afforded. The does should always have some kind of feed at kidding time.

In the morning the flock is carefully examined, and all does which show signs of kidding during the day should be separated and placed in one of the small corrals. The large flock is now turned out, and one of the men is sent with them with instructions to take the herd at once as far as he intends to go for feed that day, and then to let them feed over a limited area and gradually work their way home. A few does will drop their kids on the range, and the herder should carefully note the number and their location. He should see that the herd does not feed around one of these does, as she is apt to leave her kid and join the band, thus necessitating much extra work in finding the kid and in giving it to its mother. Early in the afternoon the band is placed in one of the large corrals. Now the herder and another man go out with a wagon or on foot and carry the kids home, gently driving the mothers. The kids should not be handled or rubbed against one another more than is necessary, as the doe knows her kid by the scent. These does and kids are placed in the small corral which contains the does held back in the morning with the expectation that they would kid during the day. We now have one day's kidding in one of the small corrals. The does and kids should be watched to see that they are properly arranged. Do not bother them more than is absolutely necessary. Do not be in a hurry to make a doe own a kid. Do not drive the goats around one of the small pens.

The does should remain with their kids in the corral for a day or two at least, or until the kids are properly mothered. Any does which have not kidded should be taken out. The next morning any kids which may have been born during the night are put in another small corral with their mothers, as well as the does which are expected to kid during the day. The procedure of the previous day is repeated. In about three days, if one has limited quarters, the first day's mothers and kids may be put in the second large corral; that is, the one with the jump board at the gate. Now this "wet" band is placed in charge of one of the men and sent out to feed. The gate is opened, the mothers passing out over the jump board, and the kids remain in the coral. The herder must not range his goats near the does that are kidding upon the range, and he should be cautioned to come in later than the "dry" band, so as to avoid any possibility of their mixing. When his band arrives at the corral the gate is opened, and each mother hunts for her kid. Some of the kids may not find their mothers, and if after a day or two there are a few un nourished kids and some does with overdistended udders they should be placed together in the small pens along the side of the coral. The doe will own the kid in a day or two whether she is its mother or not. The kids should not be allowed to become too weak before this is done. If one does not have enough small pens, a doe may be held while two or three kids suckle her, and thus tide them over until some of the small pens are vacant.

The next day the second day's kidding is added to the wet band. The wet band thus gradually grows, while the dry band decreases. During the day two men will be employed at herding the dry and wet bands, respectively, and the third man will be kept busy inspecting the kids, feeding the does in confinement, etc. If the weather is stormy some of the kids will have to be sheltered. The advisability of having the kids dropped gradually through a period of thirty or forty days will readily be seen. If help is inexperienced they may be gradually trained, or if the weather is stormy there will be time to get all things arranged properly.

The kids should not be allowed to go with their mothers until they are about 6 or 8 weeks' old. If they go before this, they will probably become tired very soon and go to sleep. When they awake the band will have gone, and they are liable to be lost. During the day, while the mothers are feeding, the kids would eat a little grass if they could be herded near the corral.

As stated before, there may be many modifications of this method which will suggest themselves, but the above is a general outline of a method commonly in use.

The Staking Method.

This method is largely employed, even with large flocks in New Mexico, but is possibly best suited to small flocks. It is without doubt the best method for certain surroundings. About the same amount of help will be required as with the corral method. There should be a good supply of stakes similar to tent stakes. There should also be a supply of swivel blocks which are about 4 inches long and having a hole bored near each end. A piece of rope about 6 inches long is fastened to the stake, and the other end is passed through one of the holes in the swivel block and a knot tied in the end. Another piece of rope of equal length is likewise knotted and passed through the other hole of the swivel block, the loose end being tied to the kid's leg. Any swivel will take the place of this primitive method. The herder or owner can busy himself during the winter months by making stakes and swivels and by cutting and attaching the ropes.

When a kid is born it is taken to a convenient place to stake and the mother is gently coaxed to follow. The stake is securely driven into the ground, and the kid fastened to it by the hind leg. The mother is left with the kid, in order that she may know where to find it upon returning from feeding. The kid should be staked

where he can get plenty of sunshine, shade, and shelter. A small bush, a post, or a box will answer the purpose admirably. If there are twins, they must be so staked that they can suckle at the same time. The rope should be changed from one hind leg to the other occasionally, to prevent unequal development. Sometimes a vigorous kid gets thoroughly tangled and requires help.

The kid may thus be left staked until he is old enough to go with the flock, which is after 6 or 8 weeks, or he may be put in a corral after a few days, as is done in the corral method.

There are many successful breeders who use this method entirely. One may expect to get good results if he follows either the corral or staking method carefully.

There is very small loss among kids cared for as set forth above. Many of the breeders on a large scale report the percentage of increase as 100. This does not mean that every kid lives, but that so few die that the loss is offset by the number of twins that are dropped.

The most practicable fencing to be used at kidding time is made of portable panels. By the use of these panels a fence pen may be made large or small and be moved from one place to another without difficulty and with very little work.

Weaning.—Kids should not be weaned until they are $4\frac{1}{2}$ months old unless they are very strong; but they should not remain with their mothers after they are 5 months old. This especially applies to the buck kid, as they will often breed at 6 months of age or even younger.

Castration.—The buck kids not reserved for breeding purposes should be castrated when about two weeks old. The earlier it is done, the better will be the meat and the mohair. It is pointed out in previous pages that the mohair from wethers ranks with that from the does, and the flesh is superior to that of the does and inferior only in small degree to that of the kids. A cool day should always be selected for the operation of castration and careful attention given for a few days.

THE BUILDING UP AND MANAGEMENT OF A FLOCK OF ANGORA GOATS.

THE BEST FLOCK.

It is assumed that whoever goes into the business of raising Angora goats does so for the production of mohair, rather than meat or skins, and so it is to his interest to have a flock that will yield a profit from the beginning. The best flock for this purpose is one composed of thoroughbreds. Such a flock will yield good mohair from the first. Those who enter upon the business of goat raising, however, must make their operations conform to their capital, the same as in any other business. They will find that desirable does will cost from \$5 to \$12 each, and bucks all the way from \$50 to \$100 each; so that a large herd of this kind, although preferable, will cost a small fortune, and is beyond consideration by most people who will engage in the industry.

BUILDING UP A FLOCK FROM SMALL BEGINNING.

Another plan that may be pursued by one who has limited capital, but time and the patience to wait, is to begin with a few first-class animals and build up a flock from these. The result will be satisfactory, and the only drawback is the length of time required. After all, this may be the wisest plan for most beginners to pursue, as experience, so necessary always to success, will be gained as the flock increases.

BUILDING UP A FLOCK BY CROSSING UPON THE COMMON GOAT.

It is noted in the historical part of this paper that the Turks many years ago began the practice of crossing Angora bucks upon Kurd does. They probably had in mind the twofold purpose of producing thereby a hardier goat than the pure Angoras and of increasing the number of goats in order to supply the increased demand of Europe for mohair. Crossing the Angora bucks upon the common goats of the United States has been practiced since their introduction, and the results have been very satisfactory in many respects. Many of the large flocks of Texas and New Mexico have had Mexican does for their foundation. Building up a good mohair-producing flock upon this plan requires five or six years. The advantages are that the does with which the beginning is made are cheap, costing from \$1.50 to \$2.50 per head. During the first and second crosses there are many twin kids, thus increasing the herd in that proportion—a condition not existing, except to a small extent, among either the purebred or thoroughbred Angoras; the size and hardiness of the progeny are increased and the liability to disease decreased.

Care should be exercised in starting a flock by this method to select only such common does as are entirely white; any other color, however slight, is objectionable. If otherwise, the results might be satisfactory, but the probabilities would be the contrary. In handling the crosses the breeder often finds that atavism becomes apparent when it is most objectionable. For instance, the progeny for two generations of a doe having black spots might appear all that is desirable, while the third generation would produce the latent color.

It is always quite necessary that the common does should be of the short-haired variety. Long-haired ones will give trouble in persisting to throw out long hairs among the mohair.

The buck used upon these does should be the best one can afford. The better the buck, the better the result. There will be many twins among the kids from this first cross, and if proper care is exercised at kidding time it will not be difficult to increase the flock as much as 100 per cent. The higher the cross the fewer twins will be dropped. As the fleece upon the first cross is not worth more than the effort to

clip it, the males among them should be castrated when about 2 weeks old and disposed of for meat as soon as old enough. The females among them, being half-blood Angoras, are kept for service with another thoroughbred buck. The result of this second cross is three-quarter blood Angoras. The mohair from them has a marketable value, but is very limited in quantity and usually mostly kemp. It is best to deal with this cross in the same manner as with the first cross. If this method of procedure is followed up to the fifth or sixth cross a flock will result that will produce most excellent mohair.

It has no doubt occurred to the reader that we now have four or five different grades of does, beginning with the common breed. Therefore after a thoroughbred flock has once been produced in this manner, each year brings forth another one from the same sources, and this condition continues as long as the breeding life of the does continues.

PROPER AGE FOR BREEDING.

Goats of both sexes will sometimes breed when they are 5 months old, and often at 6 months; but from the fact that they are at this age but a month or two from weaning time and are not nearly full grown, it is obvious that they should not be permitted to breed. They reach maturity when about 16 or 18 months old, and they ought not to breed before this time. If bred earlier the kids will not be so strong or so well developed. They are in their prime when from 2 to 6 years old, but with proper feeding in winter they have been known to breed regularly until 15 years old. The average life of goats, however, is about 12 years. There should be no tendency to keep does until they are very old unless they bring kids of exceptional merit, for it must be remembered that their mohair gets coarser, and consequently less valuable, as they grow older.

The accompanying illustration (fig. 7) shows how the age of goats may be determined until they are 4 years old. After that, in the absence of definite information, the age is a mere matter of guess, based upon the general appearance of the animal. The new teeth are longer and larger.

IN-AND-IN BREEDING.

In-and-in breeding means the breeding of related individuals. The term is indefinite, and with some refers to a close relationship and with others any degree of relationship. The correspondence of the Bureau with goat raisers shows that the term with them means generally the breeding of individuals of close relationship.

It is safe to say that there is an overwhelming sentiment against the practice, as most breeders are agreed that the result is a smaller goat with a delicate constitution. It is quite generally agreed, however, that this practice will give a fleece of finest fiber, having a beautiful

luster and little oil, but the weight will not be so great. Those who favor the practice contend that the quality more than offsets the quantity. The animals resulting from this practice are not so large and strong as those which are not related. The fact must not be overlooked, however, that Mr. John S. Harris, of Oakley, Idaho, has followed in-and-in breeding continuously and with evident success, and, too, the goats are kept in a climate where the temperature in winter

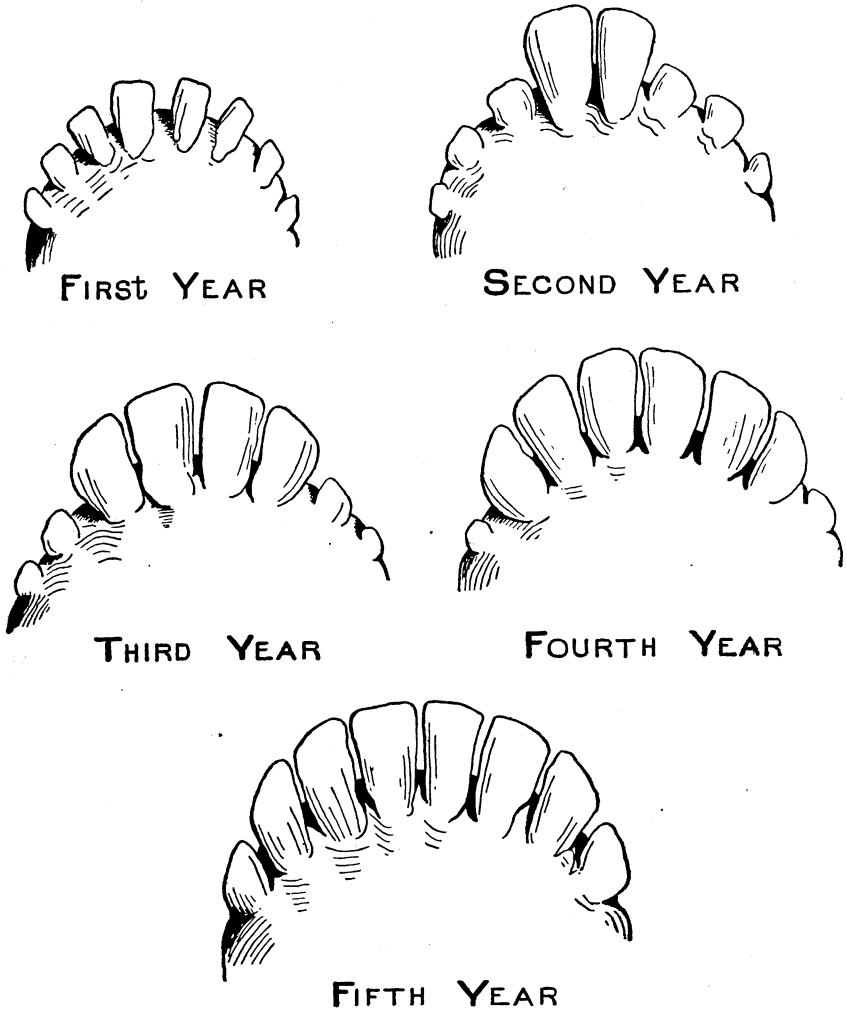


FIG. 7.—The age of goats shown by the teeth. [Copied from Bryan Hook's "Milch goats and their management."]

is sometimes far below zero. But Mr. Harris is a gentleman who understands the art of breeding; if all goat raisers knew so well the principles of breeding as he does there might not be so many to condemn the practice. However, they have learned much by experience, and it can not be contended that they are wrong in advising generally against the practice.

MANAGEMENT OF THE BUCK.

Bucks usually come in heat about the middle of July and continue so about six months; does, however, do not usually come in heat until the latter part of August or the 1st of September. As the period of gestation in goats is from 147 to 155 days (or about five months), care must be taken in mating the animals in order to have the kids dropped in proper season, which will vary somewhat with the locality. The kids should not come before the warm days of spring, or when vegetation begins to put out vigorously. Therefore the buck should be put to service from November 1 to December 1, so that the kids will come about the 1st of April or May. The only objection to earlier kidding is the extra care required to preserve the life of the kids, for they are exceedingly delicate for a few days, as has been stated before, and even a little cold at this season will probably prove fatal.

A buck, like any other domestic animal, should be in the best possible condition when put to service. He should be well fed with grain for a few weeks before this time, and the feeding should be kept up until a few weeks after his service is ended.

As to the number of does which a buck may serve, there is a great diversity of opinion. The greater number of goat raisers, however, think forty or fifty is all that may be served with good results. Col. Richard Peters wrote that he had obtained the best results with two hundred breeding does by turning in with them ten selected bucks. His object was to have the kids come as nearly at one time as possible, thus shortening the period of careful watching.

Where there are very large flocks it is not always desirable that the kids should all come at one time. If they are dropped at intervals for a month, one attendant may thus be enabled to look after a large number, whereas if all come about the same time, one attendant could not do the work, and assistants who may be strangers to the flock would be necessary. It is not well to have many strangers with these goats at any time, and certainly not at kidding time. Upon this point Mr. G. A. Hoerle has written out a plan, given below, which is quite generally followed where there are large flocks:

A great difference of opinion exists as to how many ewes an Angora buck should be allowed to serve. This depends both upon the bucks and the condition they are in, as well as upon the length of the period during which you want the kids to drop. In a small herd, and where ample conveniences for kidding are furnished, so that good care can be taken of all the kids at once if necessary, one buck should serve from 30 to 50 (as above said, according to the animal); but should the flock be large, and owing to the uncertainty of the climate or the insufficient help or shelter it should be desirable to have the kids drop gradually, say during a period of two months, especially when winter kidding is made a practice, from 75 to 150 ewes for each buck is not too much—again, according to animal and time. They should not run with the entire flock at once, but begin with, say, one-third to one-fourth of it, according to circumstances. The next similar fraction should be put in the breeding flock from two to five days later, and so on until gradually the entire flock is with the bucks. In this way a full crop of kids would be insured and at the same time the bucks prevented from doing excessive service.

The handling of "riginals" (ridgels) should have a word here. If the one testicle which descends is removed, the riginal will not get kids, but he will bother the does. If the descended testicle is not removed, he will breed without difficulty. He should be killed as soon as practicable.

NUMBER OF KIDS.

Thoroughbred Angora goats do not often drop more than one kid at a time, while the common goats nearly always drop two. There are many twins with the first cross, but the number diminishes as the crosses become higher. It is stated that the purebred Angoras never dropped but one at a time, and that the presence of twins in a flock is evidence of a base origin of the goats. The latter statement is disputed by some, who believe that the purebred Angora (having no trace whatever of base blood) will drop twins as regularly as the common goat.

SIZE OF FLOCKS.

All goat raisers agree that Angoras can not stand crowding together, and the higher the grade of the goats the more susceptible are they to injury from crowding. But to state just how many should be kept in a flock is difficult, as the number depends upon the character of their restraint. Where they have the range at day and large yards at night the flocks may be very large, but where they have pastures and small pens at night the flock must not be large.

SHEARING AND SHEDDING.

. SHEARING ONCE OR TWICE A YEAR.

In Texas, New Mexico, Arizona, and sometimes in California shearing is done twice a year—in the months of March or April and in September or October. The reasons are that, owing to the warm climate, the fleece will often shed in the fall if not clipped. Mr. H. T. Fuchs, of Tiger Mill, Tex., says: "I find it quite necessary to shear twice a year, as they suffer too much from heat in the summer and autumn and even during the warm days in winter if they are not sheared about the middle of September, and in the springtime as soon as they begin to shed their long silky hair." There are instances in these localities where goats carry their fleece through the year, but all breeders, except in some parts of California, report the practice of shearing twice a year. In the other parts of the country shearing is done but once a year, and that in the months of March or April. The rule for shearing time does not depend so much upon the calendar as upon the condition of the fleece. It should not be delayed until the fiber begins to shed, as then the oil will begin to go back into the body of the animal, the mohair thus losing its life and luster.

As to the relative values of the semiannual and annual fleeces, there does not seem to be much difference of opinion. The semiannual fiber is shorter and therefore less desirable for fabricating, and the price is not so high as for that of the annual fleece. It is generally agreed that the two shearings combined weigh a little more than the annual shearing, but probably the increase does not average more than a quarter of a pound. However, some who have practiced it report that the gain is not equal to the cost of the second shearing, and that shearing twice is done from necessity rather than from the standpoint of profit.

USE OF CLIPPING MACHINES.

The use of clipping machines, although largely employed among large sheep raisers, has not yet become general among goat raisers. Those who have used them indorse them, and they will no doubt soon come into general use. They are more rapid than hand work, and the results are more satisfactory. The cutting of the skin is easily avoided in reasonably careful hands, while it requires extreme care with hand shears to prevent cutting.

Of course, the goat raiser will consider the relative cost of shearing with machines and by hand before he will purchase a machine. The decision will probably depend upon the number. The cost of hand shearing is about 4 cents a head. In the Southwest there are Mexicans who follow the profession of shearing sheep and goats; these usually receive 2 cents a head with their board. Many of them will shear 85 or 90 a day, the average of all being about 60. Any man who can shear sheep can shear goats. If shearing is done by hand, a short-bladed shear should be used in order to avoid cutting the hair twice.

Another objection to hand shearing is that there is often double cutting of the hair. The result is a shortening of the fiber and an increased amount of noilage.

WASHING BEFORE SHEARING.

If the animals are well cared for during the year, their fleece will not require washing before clipping. One writer of experience says that "the natural habits of the Angora goats are clean enough to enable spinning before washing, at least for some purposes." Any dirt that may adhere to the fleece should carefully be picked off after shearing.

CARE OF THE FLEECE AFTER SHEARING.

The operation of shearing should be done in a building free from straw and dirt, which might adhere to the fleece after it drops from the goat. It should then be rolled up, inside out, and packed in the sack without being tied in any way. This is the manner in which the mills desire to receive it. The practice of tying the fleece with almost any

kind of twine that may be at hand obtains very largely among goat raisers, but the wishes of the mill operators are already receiving proper attention. The reasons why the mill operators do not desire fleeces tied are very forcibly stated by one of them (George B. Goodall), as follows:

I want to mention another evil which should be corrected, and that is the use of twine or string around the fleeces. Vegetable fibers will not take dyes used for animal fibers, and in cutting these strings by the sorters more or less of the vegetable fibers get into the mohair and have to be carefully burled out from the face of the finished goods, which adds to the cost of each piece. A mohair fleece should be simply rolled up without twine of any description. You never see it on Turkey or Cape mohair.

If mohair producers insist on the use of twine, the quality should be hard and smooth, so that no particle of it will adhere to the mohair when it is cut away.

As to assorting the fleeces with reference to the quality of the mohair, no common practice is followed by producers. Some assort them at shearing time and pack in separate sacks, while others pack all sorts together. If the producer is a good judge of mohair, the former method will prove more satisfactory. When all are packed together indiscriminately, the poorer grades of fiber tend to reduce the average price of the whole lot. However, many prefer to pack thus indiscriminately, leaving the work and judgment of assorting to the commission merchant. Most of the mills purchase from the commission merchant because of his skill in assorting.

There are appended some opinions on this subject of Mr. Hoerle which are worthy of consideration:

Before folding up the fleeces they should be carefully assorted, if this is possible, in the following way:

- A. Combing hair, or all hair over $4\frac{1}{2}$ inches in length:
 1. The very finest, as fine as fine kid hair.
 2. Next finest, or average run of good doe fleeces.
 3. General run of fair doe and good wether fleeces.
 4. Coarse fleeces.
- B. Carding hair, or less than $4\frac{1}{2}$ inches long:
 1. Fineness of class 1 above.
 2. Fineness of classes 2 and 3.
 3. Coarse fleeces.

At shearing time fleeces of similar quality and length should be packed together, and special care should be taken not to allow tag ends and burrs to remain in the fleeces. The latter should be carefully picked out before the shearing begins and the former pulled off before packing and placed in a special bag, and marked separately. It is much more profitable to have small lots of low-priced short ends and tags and to pull out with the burrs a few strands of the mohair than to have an entire clip depreciated by careless shearing and packing.

DISEASES AND OTHER ENEMIES.

Goats are less subject to disease than sheep; but these species are so closely allied that treatment in cases of disease is the same for both. Several accounts have been published in the agricultural press of goats

in the Southwest being affected with stomach worms and with grub in the head, the same as sheep are affected in the same localities. There are occasionally outbreaks of disease in certain localities, but these are due to local causes, and generally have not been difficult to overcome.

The treatment recommended for the screw worm is as follows: Add to any one of the carbolic sheep dips 10 per cent of chloroform. Apply this mixture, after thoroughly cleaning the wound, with a wad of cotton. The chloroform immediately destroys the larvæ and the carbolic dip prevents the further blowing of the wound.

The stomach worm (*Strongylus contortus*) is the same form as found in sheep, cattle, and deer. The treatment in all cases is the same as for sheep.

Goats have at least two kinds of scab parasites peculiar to their species, but apparently only two kinds of scab develop. Psoroptic scab of sheep does not develop disease upon them, though it can undoubtedly sustain life for a while.

Tapeworms of the genus *Moniezia* are found in goats. In the intestines are also found five round worms, namely, *Strongylus filicollis*, *Oesophagostoma venulosum*, *Sclerostoma hypostomum*, *Uncinaria cernea*, and *Trichocephalus affinis*.

Verminous pneumonia of sheep also occurs in goats.

Tuberculosis is so rare in goats that every case discovered has been recorded, the number of such cases being less than a dozen. It may be said, therefore, that they are practically immune from this widespread and insidious disease.

Goats are apt to have foot rot, but a cure is easily effected by the use of sulphate of copper (blue vitriol). It is usually applied by driving the goats through a trough containing a solution of strong blue vitriol. The solution should be about an inch in depth. Oscar Tom, a breeder of much experience, says:

Butter of antimony applied with a stiff feather will cure it, or mix 1 ounce of sulphuric acid with 2 ounces of vinegar and apply as above. Go over the whole band. Generally one application cures if well done. Change the range at the same time if you can.

Angoras are frequently affected with lice, which cause a loss of mohair from the rubbing and scratching of the goat. The lice may be exterminated by dipping. The common sheep dips are generally used for the purpose. It is a common practice to dip the goats once a year, and some advise dipping twice a year—in spring just after shearing and again in the fall.

One of the principal enemies of the Angoras is the wolf. The best guard against wolves is a good wire fence. Sometimes the wolves dig under the fence, and then it becomes necessary to trap them. This is practiced by Mr. H. T. Fuchs, who says:

Three steel traps are fastened to each other, but to nothing else, and catch the wolves. If the trap is made fast the wolf will break loose, but the weight of three traps fastened together simply tires the wolf out, and it rarely drags them more than 200 or 300 yards.

In many localities the wildcats are especially troublesome. Their prey is the kids.

The fact that many plants which are poisonous to sheep and cattle may be eaten with impunity by goats is frequently referred to by writers for the press. It is true, however, that goats sometimes die from eating poisonous plants, especially in the mountainous districts of the Carolinas, as the Bureau is informed through correspondence. The so-called "ground ivy" is specially referred to. It is believed that goats will not eat poisonous plants to an injurious extent unless driven by hunger to do so.

PRODUCTION OF MOHAIR.

The quantity of mohair of all grades produced in the United States has been a matter of guess, and the estimates have been wide apart. Assuming that practically the entire domestic product goes to the mills for fabrication, the Bureau addressed to the mills that consume mohair a request to be furnished a statement of the amount of domestic and imported mohair used annually. It is believed, therefore, that these statistics which are given herewith represent the total product of the United States for the year 1899:

Consumption of mohair in the United States in 1899.

Mills.	Domestic.	Imported.
	<i>Pounds.</i>	<i>Pounds.</i>
Sanford Mills and the Goodall Worsted Co., Sanford, Me	840,000	460,000
Tingue Manufacturing Co., Seymour, Conn		15,000
Atlantic Mills, Providence, R. I		1296,465
Gold Medal Braid Co., Attleboro Falls, Mass.		1,000
Massachusetts Mohair Plush Co., Lowell, Mass	200,000	300,000
Westfield Braid Co., Westfield, Mass.		18,000
Cranston Worsted Mills, Bristol, R. I	32,000	39,000
Queensbury Mills, Worcester, Mass	5,000	
Total.....	1,077,000	1,119,465

¹ Not certain it was imported mohair, but assumed to be.

The customs figures of the Cape of Good Hope, as quoted by W. Hammond Tooke, show that mohair was produced there for various years previous to 1898 in the following amounts:

	<i>Pounds.</i>		<i>Pounds.</i>
1877	1,433,774	1894	10,003,173
1882	3,766,657	1895	11,090,449
1887	7,153,730	1896	10,001,028
1892	10,516,837	1897	12,583,601
1893	9,457,278		

According to Commercial Relations for 1899 the entire product of the Cape of Good Hope for 1897 was exported, as well as that for 1898, which is given as 10,876,014 pounds.

It has not been possible to obtain figures showing the production of Turkey for any specific year or for a series of years, but the average annual production is frequently given as 7,650,000 pounds.

TARIFF.

The act approved July 24, 1897, places a duty of 12 cents per pound upon mohair. Mohair cloth for buttons is taxed 10 per cent ad valorem. The duty on dressed and finished goatskins is 20 per cent ad valorem; on skins for morocco, tanned but unfinished, 10 per cent ad valorem. These rates are subject to increase under certain conditions of shipments.

REGISTRATION ASSOCIATIONS.

The Bailey Angora Goat Registration Association, of San Jose, Cal., has kept a private register many years, and became a general record association in 1898.

There are two registration associations in the United States which were organized during the year 1900—the American Angora Goat Breeders' Association, with headquarters at Kansas City, Mo., and the National Angora Record Association, with headquarters at Salem, Oreg.

FARMERS' BULLETINS.

The following is a list of the Farmers' Bulletins available for distribution, showing the number, title, and size in pages of each. Copies will be sent to any address on application to Senators, Representatives, and Delegates in Congress, or to the Secretary of Agriculture, Washington, D. C.:

16. Leguminous Plants. Pp. 24.
19. Important Insecticides. Pp. 32.
21. Barnyard Manure. Pp. 32.
22. The Feeding of Farm Animals. Pp. 32.
23. Foods: Nutritive Value and Cost. Pp. 32.
24. Hog Cholera and Swine Plague. Pp. 16.
25. Peanuts: Culture and Uses. Pp. 24.
26. Sweet Potatoes: Culture and Uses. Pp. 30.
27. Flax for Seed and Fiber. Pp. 16.
28. Weeds: And How to Kill Them. Pp. 32.
29. Souring and Other Changes in Milk. Pp. 23.
30. Grape Diseases on the Pacific Coast. Pp. 15.
31. Alfalfa, or Lucern. Pp. 24.
32. Silos and Silage. Pp. 32.
33. Peach Growing for Market. Pp. 24.
34. Meats: Composition and Cooking. Pp. 29.
35. Potato Culture. Pp. 24.
36. Cotton Seed and Its Products. Pp. 16.
37. Kafir Corn: Culture, and Uses. Pp. 12.
38. Spraying for Fruit Diseases. Pp. 12.
39. Onion Culture. Pp. 31.
40. Farm Drainage. Pp. 24.
41. Fowls: Care and Feeding. Pp. 24.
42. Facts About Milk. Pp. 29.
43. Sewage Disposal on the Farm. Pp. 20.
44. Commercial Fertilizers. Pp. 24.
45. Insects Injurious to Stored Grain. Pp. 24.
46. Irrigation in Humid Climates. Pp. 27.
47. Insects Affecting the Cotton Plant. Pp. 32.
48. The Manuring of Cotton. Pp. 16.
49. Sheep Feeding. Pp. 24.
50. Sorghum as a Forage Crop. Pp. 20.
51. Standard Varieties of Chickens. Pp. 48.
52. The Sugar Beet. Pp. 48.
53. How to Grow Mushrooms. Pp. 20.
54. Some Common Birds. Pp. 40.
55. The Dairy Herd. Pp. 24.
56. Experiment Station Work—I. Pp. 31.
57. Butter Making on the Farm. Pp. 16.
58. The Soy Bean as a Forage Crop. Pp. 24.
59. Bee Keeping. Pp. 32.
60. Methods of Curing Tobacco. Pp. 16.
61. Asparagus Culture. Pp. 40.
62. Marketing Farm Produce. Pp. 28.
63. Care of Milk on the Farm. Pp. 40.
64. Ducks and Geese. Pp. 48.
65. Experiment Station Work—II. Pp. 32.
66. Meadows and Pastures. Pp. 28.
67. Forestry for Farmers. Pp. 48.
68. The Black Rot of the Cabbage. Pp. 22.
69. Experiment Station Work—III. Pp. 32.
70. Insect Enemies of the Grape. Pp. 23.
71. Essentials in Beef Production. Pp. 24.
72. Cattle Ranges of the Southwest. Pp. 32.
73. Experiment Station Work—IV. Pp. 32.
74. Milk as Food. Pp. 39.
75. The Grain Smuts. Pp. 20.
76. Tomato Growing. Pp. 30.
77. The Liming of Soils. Pp. 19.
78. Experiment Station Work—V. Pp. 32.
79. Experiment Station Work—VI. Pp. 28.
80. The Peach Twig-borer. Pp. 16.
81. Corn Culture in the South. Pp. 24.
82. The Culture of Tobacco. Pp. 24.
83. Tobacco Soils. Pp. 23.
84. Experiment Station Work—VII. Pp. 32.
85. Fish as Food. Pp. 30.
86. Thirty Poisonous Plants. Pp. 32.
87. Experiment Station Work—VIII. Pp. 32.
88. Alkali Lands. Pp. 23.
89. Cowpeas. Pp. 16.
90. Manufacture of Sorghum Sirup. Pp. 32.
91. Potato Diseases and Treatment. Pp. 12.
92. Experiment Station Work—IX. Pp. 30.
93. Sugar as Food. Pp. 27.
94. The Vegetable Garden. Pp. 24.
95. Good Roads for Farmers. Pp. 47.
96. Raising Sheep for Mutton. Pp. 48.
97. Experiment Station Work—X. Pp. 32.
98. Suggestions to Southern Farmers. Pp. 48.
99. Insect Enemies of Shade Trees. Pp. 30.
100. Hog Raising in the South. Pp. 40.
101. Millets. Pp. 28.
102. Southern Forage Plants. Pp. 48.
103. Experiment Station Work—XI. Pp. 32.
104. Notes on Frost. Pp. 24.
105. Experiment Station Work—XII. Pp. 32.
106. Breeds of Dairy Cattle. Pp. 48.
107. Experiment Station Work—XIII. Pp. 32.
108. Saltbushes. Pp. 20.
109. Farmers' Reading Courses. Pp. 20.
110. Rice Culture in the United States. Pp. 28.
111. Farmers' Interest in Good Seed. Pp. 24.
112. Bread and Bread Making. Pp. 39.
113. The Apple and How to Grow It. Pp. 32.
114. Experiment Station Work—XIV. Pp. 28.
115. Hop Culture in California. Pp. 27.
116. Irrigation in Fruit Growing. Pp. 48.
117. Sheep, Hogs, and Horses in the Northwest. Pp. 28.
118. Grape Growing in the South. Pp. 32.
119. Experiment Station Work—XV. Pp. 31.
120. Insects Affecting Tobacco. Pp. 32.
121. Beans, Peas, and other Legumes as Food. Pp. 32.
122. Experiment Station Work—XVI. Pp. 32.
123. Red Clover Seed: Information for Purchasers. Pp. 11.
124. Experiment Station Work—XVII. Pp. 32.
125. Protection of Food Products from Injurious Temperatures. Pp. 26.
126. Practical Suggestions for Farm Buildings. Pp. 48.
127. Important Insecticides. Pp. 42.
128. Eggs and Their Uses as Food. Pp. 32.
129. Sweet Potatoes. Pp. 40.
130. The Mexican Cotton Boll Weevil. Pp. 30.
131. Household Test for Detection of Oleomargarine and Renovated Butter. Pp. 11.
132. Insect Enemies of Growing Wheat. Pp. 40.
133. Experiment Station Work—XVIII.
134. Tree Planting in Rural School Grounds.
135. Sorghum Sirup Manufacture.
136. Grape Culture in the North.